

Improved Traditional Medicines in Mali

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Left: The Department for Traditional Medicine, Bamako, Mali. Photo © Merlin Willcox. **Right:** Médicaments Traditionnels Améliorés for sale on a stall (Bamako, Mali). Photo © Merlin Willcox. Color images available online at www.liebertonline.com/acm

Introduction

MALI IS UNUSUAL IN ENJOYING a high level of government support for research and development of traditional medicines. The Department for Traditional Medicine, within the National Institute for Research on Public Health (part of the Ministry of Health), was founded in 1968 (originally as the National Institute of Phytotherapy and Traditional Medicine), and in 2005 moved to new purpose-built premises. Since 1979, one of its aims has been the development of standardized “Médicaments Traditionnels Améliorés” (MTAs, or improved traditional medicines).

The “improvement” lies in the pharmacologic evidence of safety and efficacy, the standardized dose and quality control. In order to obtain marketing authorization, a dossier of information on the remedy’s safety and efficacy must be submitted to the Commission Nationale d’Autorisation de Mise sur le Marché of the Ministry of Health. Malian regulations categorize traditional medicines as shown in Table 1.¹ The requirements for the dossier vary according to the category (Table 2). Most MTAs are of category 2, for which clinical trials are not an absolute requirement.

Since 1990, MTAs have been included on the Essential Drugs List of Mali, are included in the Malian National Formulary² alongside conventional drugs, and are distributed through pharmacies. There are currently seven approved MTAs in the formulary² (Table 3), and more are under development. They are intended to be a safe and effective, but locally produced and less expensive, alternative to imported medicines. This article is a systematic review of the preclinical and clinical literature on the safety and efficacy of these medicines. Voucher specimens of all these plants have been deposited at the herbarium of the Département de Médecine Traditionnelle (Table 3). Monographs for all these plants are available online at: http://portal.ics.trieste.it/MAPs/MedicinalPlants_Country.aspx#Mali

Balembo syrup (*Crossopteryx febrifuga*)

Crossopteryx febrifuga Benth. (Rubiaceae) is a small tree 5–6 m high with small round fruit, which become black when ripe (Fig. 1). They are rich in flavonoids and polysaccharides. The seeds have anti-inflammatory properties.³

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TABLE 1. CATEGORIES OF TRADITIONAL MEDICINES IN MALIAN LAW¹

Category	Description
1	Traditional medicine prepared by a traditional health practitioner for an individual patient with fresh or dried raw materials, with a short shelf life
2	Traditional medicine currently used in the community, prepared in advance, and composed of crude raw materials
3	Standardized extracts prepared in advance following scientific research
4	Molecules purified from traditional medicines following scientific research

The fruits are boiled in water to produce a syrup, which was the most effective of several antitussive remedies tested,⁴ and is nontoxic when given orally.⁵ There was very low toxicity at the dose of 30 g/kg administered orally in mice.* In the model of cough in guinea pigs provoked by nebulized citric acid, it reduced the number of coughs by 63% at a dose of 250 mg/kg, and by 77% at a dose of 1 g/kg (compared to 76% by codeine at 10 mg/kg). The lower dose of 50 mg/kg was not effective.⁶ The remedy (at an oral dose of 1 g/kg) also reduced antigen-induced bronchoconstriction in guinea pigs by 54%, compared to a reduction of 78% by disodium cromoglicate (at a dose of 10 mg/kg). However, it had no effect on histamine-induced bronchoconstriction, and aqueous extracts were not active against bacteria that commonly cause respiratory infections.⁷ A clinical trial in 32 patients with cough showed improvement after 7 days,* and a sedative effect.⁵ Now Balembo syrup is the most frequently prescribed MTA; it is prescribed by up to 76% of biomedical health workers in Mali, and is also the most widely known by patients.⁸

Dysentéral (*Euphorbia hirta*)

Euphorbia hirta (Euphorbiaceae) is a common pantropical weed (Fig. 2), widely used in many African countries for the treatment of dysentery.⁹⁻¹¹ *E. hirta* is active *in vitro* against several different microorganisms that cause diarrhea or dysentery (Table 4). All studies show a good activity against *Entamoeba histolytica*, and the whole plant is more active than the leaves alone.¹² There are conflicting results for *Escherichia coli*: One study from India shows good activity,¹³ whereas two from Africa show minimal or no activity.^{14,15}

Furthermore, *E. hirta* contains tannins (such as ellagic acid and gallic acid) and flavonoids (such as quercetin), which have antidiarrheal and antiamoebic activity.^{12,16} The water extract has spasmolytic activity on guinea-pig ileum^{9,17} and reduces castor-oil-induced diarrhea in mice.¹⁸

The pharmacology, chemistry, and toxicology of the plant have been studied extensively.^{9,19} The aerial parts contain shikimic acid and the roots and sap contain phorbol esters, which are potentially carcinogenic,^{5,9} although in an experi-

TABLE 2. COMPONENTS OF THE BROCHURE FOR REQUESTING A MARKETING AUTHORIZATION FOR A TRADITIONAL HERBAL MEDICINE IN MALI¹

Section	Detailed components
1. Covering letter	Addressed to the Ministry of Health and including the name and address of the manufacturer
2. Administrative dossier	<ul style="list-style-type: none"> • Registration document of the manufacturer • Memoranda of understanding between the manufacturer and a research institution^a
3. Samples	10 samples as sold
4. Fees	Receipt for registration fees
5. Pharmaceutical dossier ^b	<ul style="list-style-type: none"> • Complete monograph(s) of the component plant(s) • Method and stages of preparation and production • Expert report on Good Manufacturing Practices
6. Expert analytical report	<ul style="list-style-type: none"> • Quality control method for raw materials • Results of stability and quality control tests of raw materials and excipients • Method and results of quality control during production • Results of quality control of the finished product • Results of stability tests of the finished product
7. Pharmacology and toxicology dossier ^c	<ul style="list-style-type: none"> • Pharmacodynamic data • Results of acute and subchronic toxicity tests • Literature review of pharmacology and toxicology
8. Clinical dossier ^c	<ul style="list-style-type: none"> • Expert report on the tests carried out • Ethical approval for clinical trials • Clinical trial protocol following standard methods (phase I and II) • Results of clinical trials • Expert report on clinical trials carried out
9. Expert report on traditional use	<ul style="list-style-type: none"> • Evidence of long experience of use of the medicine in its current or traditional form (minimum 20 years) • Detailed presentation of known toxicological risks • Risks of incorrect use of the medicine • Risks of physical or psychologic dependence

^aFor medicines of categories 3 and 4.

^bFor medicines of categories 2 and 3.

^cFor medicines of category 3.

mental model *E. hirta* ether extracts had almost no tumor-promoting activity compared to other *Euphorbia* species.²⁰ Roots should not be used, and it is said that aerial parts should be dried, which removes the carcinogenic effect.^{5,†} However, one study found that drying diminishes the *in vitro*

*Kodio A. Contribution to the study of the consumption of cough syrups in the Republic of Mali: Evaluation of the need and improvement of Balembo syrup [in French; PharmD thesis]. Bamako, Mali: Ecole Nationale de Médecine et de Pharmacie (ENMP), 1986.

†Dolo A. Contribution to the study of the toxicology of Malian medicinal plants [French; PharmD thesis], Bamako, Mali: Ecole Nationale de Médecine et de Pharmacie (ENMP), 1991.

TABLE 3. THE SEVEN OFFICIAL "IMPROVED TRADITIONAL MEDICINES" IN MALI

Name	Constituent plant(s)	Plant part	Preparation	Dose	Indication	Contraindications	Voucher specimen accession number
Balemba	<i>Crossopteryx febrifuga</i>	Fruit	Syrup (10% for children, 20% for adults)	5 mL qds	Dry coughs	Children < 6 mo	No. 0052. Kangaba (03/11/1973)
Dysentéral	<i>Euphorbia hirta</i>	Aerial parts (dried)	Decoction	10 g boiled in 500 mL water, tds for 3 d	Amoebic dysentery	Do not use fresh plant	No. 0952. (03/27/1996)
Gastrosédal	<i>Vernonia kotschyana</i>	Root (dried)	Powder, mixed in cold water	5 g tds mixed in 70 mL water, 15 min before meals	Gastritis, peptic ulcer	Pregnant women, children < 8 y	No. 0929. Sotuba (03/04/1996)
Hépatisane	<i>Combretum micranthum</i>	Leaves (dried)	Decoction	10 g boiled in 500 mL water, bd	Indigestion (especially of fats), nausea, poor appetite, constipation	Obstructive jaundice, severe liver or renal failure.	No. 0031. Dologandori (05/31/1969)
Laxa cassia	<i>Cassia italica</i>	Leaves (dried)	Decoction	5-10 g boiled in 500 mL water, at night	Constipation	Children < 6 mo, inflammatory bowel disease	No. 0963. Blendio. (05/20/1997)
Malarial	<i>Senna occidentalis</i> (Caesalpinaceae): 62% <i>Lippia chevalieri</i> (Verbenaceae): 32% <i>Acmella oleracea</i> (Asteraceae): 6%	Leaves (dried) Leaves (dried) Flowerheads (dried)	Decoction	10 g, boiled in 500 mL water, bd for 4 d, then od for 3 d. Halve dose for children aged 5-12.	Malaria, fever	Children < 5 y	No. 0001. Kita (07/1963) No. 2670. Sotuba (09/26/2005)
Psorospermine	<i>Psorospermum guineense</i>	Root	Ointment, made with 1% ether extract of root powder	Apply bd for 2 weeks	Eczema	None	No. 2650. Blendio (09/25/2005)



FIG. 1. *Crossopteryx febrifuga* (Rubiaceae) black fruits are used to make a cough syrup. Photo © Merlin Willcox. Color images available online at www.liebertonline.com/acm

antiamoebic activity.²¹ Rats fed up to 5% powdered whole plant for up to 97 days in their diet showed no symptoms of poisoning, and no gross pathology on autopsy,⁹ although hypotensive effects have been found in cats and dogs.¹⁷ A daily dose of alcohol extract (corresponding to 3 g/kg of dried plant) was tested in rats for up to 27 days with no observed toxic effects.¹⁹ Aqueous extracts produced no toxicity when given orally to rats at doses of up to 30 g/kg.[‡]

Uncontrolled clinical trials of several different extracts have been carried out. The lyophilized decoction (three doses of 10 g) was effective in treating a series of 10 patients with amoebic dysentery in Senegal.⁹ A tincture of fresh aerial



FIG. 2. *Euphorbia hirta* (Euphorbiaceae) dried aerial parts are decocted to treat dysentery. Photo © Merlin Willcox. Color images available online at www.liebertonline.com/acm

parts (1:2) was tested in a series of 40 cases of acute amoebic dysentery or diarrhea at the Centre Muraz, Bobo-Dioulasso, Burkina Faso.¹⁹ Thirty-eight (38) patients were cured with a dose of 10 mL four times daily for 9 days, with normalization of the stools within 2–6 days, and no reported adverse effects.¹⁹ A second case series (using the same extract in tablet form, with a daily dose of 7.2 g of dried plant material, for 8 days) resulted in 125 cures out of 150 patients treated.²² In this series, the adverse effects reported were 12 cases of hypotension, two of nausea/vomiting, and one allergic reaction, none of which were severe. An unpublished clinical trial was conducted in Mali of “Dysentéral” treatment (according to the dosage in Table 3). Trophozoites of *E. histolytica* disappeared from the stool after 2 days, which was equivalent to treatment with metronidazole.⁵

Gastrosédal (*Vernonia kotschyana*)

Vernonia kotschyana Sch. Bip. Ex Walp. (Asteraceae) is a herbaceous plant that grows to a height of about 1 m (Fig. 3). Its thick roots are powdered and used (often mixed with hot water) for indigestion and stomach pains in Mali and Nigeria.^{23,24} The roots contain steroid glycosides (vernionosides D1-3 and F1-2)^{7,25} and different types of polysaccharides such as inulin, pectins, and arabinogalactans, some of which have anti-inflammatory and immunomodulatory properties.^{24,26}

Aqueous extracts are effective at preventing ethanol and stress-induced gastric ulcers in rats, equivalent to 50 mg/kg of ranitidine.²⁷ Two (2) uncontrolled clinical trials have been carried out in patients with gastric ulcers. In the first, 80% (of 47 patients) reported symptomatic improvement.²⁸ In the second, 16 patients were followed up after 30 days of taking *V. kotschyana* root tablets (6 g daily). Half of the patients had symptomatic improvement, and the ulcers had healed in 6 patients.^{24,‡}

Hépatisane (*Combretum micranthum*)

Combretum micranthum (Combretaceae) is a small tree, common on the poor soil of the Sahel savannah. Twigs with leaves are commonly sold in markets by the name of *kinkéliba*.²³ Like other *Combretum* species, it has characteristic four-winged fruit (Fig. 4). Chemical constituents include potassium nitrate, flavonoids (such as vitexin), organic acids, tannins, coumarins, sterols, terpenoids, carbohydrates (inositol, mannitol, sorbitol), and alkaloids (choline, stachydrine).^{5,23}

It has a wide variety of medicinal uses in West Africa, particularly as a cholagogue. In 1891, a French doctor in Gambia observed its efficacious use in the treatment of *fièvres bilieuses hématuriques* (bilious fevers with hematuria).²³ The leaves are often used to prepare a refreshing tea, but this is also used for jaundice and hepatitis.^{11,29} It was added to the French pharmacopoeia in 1937, and to the African Pharmacopoeia in 1985.²³ In Mali, patients with non-obstructive jaundice have been treated with Hépatisane and their bilirubin and transaminases have returned to normal within 2–3 weeks of starting the treatment.⁵ About 50

[‡]Toure IAK. Evaluation of the therapeutic efficacy of an improved traditional recipe (Gastrosédal) in the treatment of gastritis [in French; MD thesis]. Bamako, Mali: Faculté de Médecine, Pharmacie et Odonto-Stomatologie, Université de Bamako, 1989.

TABLE 4. *IN VITRO* ACTIVITIES OF *EUPHORBIA HIRTA* AGAINST MICROORGANISMS CAUSING DIARRHEA

Target organism	Part	Fresh or dried?	Type of extract	Active concentration (g/100 mL)	MIC (mg/mL)	Ref
<i>Entamoeba histolytica</i>	WP	Fresh	Aqueous decoction	20		20
	WP	Dried	Aqueous decoction	11		20
	L	Fresh	Aqueous maceration	16	0.250	13
	WP	Fresh	Aqueous maceration	20	0.031	13
<i>Escherichia coli</i>	L	Dried	Ethanol 95%	8	58.0	16
	AP	Dried	Ethanol		0.189	14
	WP	Dried	Methanol	10		a
<i>Salmonella typhimurium</i>	FL		Methanol	0.1.56	0.2	b
<i>Shigella dysenteriae</i>	FL		Methanol	0.1.56	0.1	b
<i>Shigella flexneri</i>	WP	Dried	Ethanol 80%	2.5		15
Polio virus	WP	Dried	Ethanol 80%	2.5		15
Coxsackie virus	WP	Dried	Ethanol 80%	2.5		15
Herpes virus	WP	Dried	Ethanol 80%	2.5		15

^aParekh J, Jadeja D, Chanda S. Efficacy of aqueous and methanol extracts of some medicinal plants for potential antibacterial activity. *Turk J Biol* 2005;29:203–210.

^bVijaya K, Ananthan S, Nalini R. Antibacterial effect of theaflavin, polyphenon 60 (*Camellia sinensis*) and *Euphorbia hirta* on *Shigella* spp.: A cell culture study. *J Ethnopharmacol* 1995;49:115–118.

MIC, minimum inhibitory concentration; AP, aerial parts; FL, flowers; L, leaves; WP, whole plant.

asymptomatic patients with chronic viral hepatitis B have been treated with Hépatisane in a clinical trial, but there was no clearance of the hepatitis B surface antigen (J. Falquet, personal communication). However, the herbal treatment was well-tolerated, there were no adverse effects, and compliance was good. Further clinical trials are needed to determine whether this treatment helps patients with symptomatic hepatitis, or whether it helps to prevent long-term consequences of chronic viral hepatitis.

Laxa Cassia (*Senna italica*)

Senna italica Mill (synonym = *Cassia italica*, Caesalpinaceae) is a shrub widespread in the dry regions of Africa, and is the local equivalent of senna (which in Europe is made from *Cassia senna* and *Cassia angustifolia*). Research has confirmed that its chemical composition is the same as that of *C. angustifolia*.⁹ The leaves and fruit are rich in sennosides (anthraquinone glycosides),³⁰ which are broken down in the colon and cecum by the gut flora to the active rhein anthrone.



FIG. 3. *Vernonia kotschyana* Sch. Bip. Ex Walp. (Asteraceae) rhizome is effective against indigestion and gastric ulcers. Photo © Merlin Willcox. Color images available online at www.liebertonline.com/acm



FIG. 4. *Combretum micranthum* (Combretaceae) leaf decoction is a popular beverage and aids digestion. Photo © Merlin Willcox. Color images available online at www.liebertonline.com/acm

This stimulates peristalsis.³¹ A common side-effect of over-stimulation is colic; this can be reduced by using dry rather than fresh plant material.⁹

Constipation is surprisingly common in Malian villages, attributable to insufficient fiber in the diet (which often consists of little more than maize-meal gruel) and insufficient water intake. As everywhere, it is important to remember that dietary advice (increasing fiber intake, and water intake) is the first-line treatment, and laxatives are a second-line treatment to be used only when absolutely necessary, because of the risk of side-effects. However, it is very sensible for African countries to manufacture their own senna from local plants, rather than to import European senna at a higher price.

Malarial

“Malarial” was first formulated by Professor Mamadou Koumaré, Professor of Pharmacognosy, former Director of the Department for Traditional Medicine, and President of the Société Malienne de Phytothérapie. It is based on a recipe used in his family, and is now produced as a standardized phytomedicine (Table 3). *Senna occidentalis* (L.) Link. (synonymous with *Cassia occidentalis*, Caesalpinaceae) is a pantropical plant (Fig. 5) widely used for the treatment of malaria³² and is active *in vitro* against malaria parasites.³³ *Lippia chevalieri* Mold. (Verbenaceae) is an aromatic herb that is used in West Africa to flavor tea and treat fevers³⁴ (Fig. 6). *Acmella oleracea* (L.) R.K.Jansen (synonymous with *Spilanthes oleracea* L., Asteraceae) is a sprawling plant with yellow flowers that have a variety of uses in traditional medicine, including as a local anaesthetic for toothache, and as an



FIG. 5. *Cassia occidentalis* (Caesalpinaceae) leaves are the major constituent of “Malarial.” Photo © Merlin Willcox. Color images available online at www.liebertonline.com/acm



FIG. 6. *Lippia chevalieri* Mold. (Verbenaceae) leaves are the second constituent of “Malarial” and are mainly used to add a pleasant flavor. Photo © Merlin Willcox. Color images available online at www.liebertonline.com/acm

antipyretic (Fig. 7). They contain spilanthal, which is effective against *Plasmodium falciparum*.³⁵ “Malarial” was evaluated against malaria parasites *in vitro* and in mice. It was not very active *in vitro* (IC₅₀ = 470–600 µg/mL) but prolonged the survival of malaria-infected mice by 2–3 days compared to the untreated controls.³⁶ It was also nontoxic to mice.

Three (3) clinical studies were carried out to evaluate the safety and efficacy of Malarial. The first took place in Baguineda in 1984–1985. The second was a randomized controlled trial comparing it to chloroquine.^{37,38} There were 53 patients included, of whom 36 were randomized to Malarial and 17 to chloroquine. Follow-up to day 21 was completed by 75% of the Malarial group, and 59% of the chloroquine group. Fever clearance was similar in both groups, but parasite clearance was better in the chloroquine group. Malarial was better tolerated than chloroquine. It was felt that the amount of *Acmella oleracea* (4%) present in this formulation of Malarial was insufficient for a truly effective schizonticidal activity.

It was therefore decided to increase the amount of *Acmella oleracea* in Malarial to 6%, and this was tested in an observational cohort study on patients with uncomplicated malaria.[†] Thirty (30) patients were included, aged 5 years or above, with a temperature of >37.5°C and a parasitemia of >3000/mcl *P. falciparum*. There was no control group. Parasitemia declined and symptoms improved. Parasitemia at day 7 remained higher in patients aged 8–19 than in older

[†]Doumbia S. Study of antimalarial plants in Mali [in French; Pharm D thesis]. Bamako, Mali: Faculté de Médecine, Pharmacie et Odonto-Stomatologie, Université de Bamako, 1997.



FIG. 7. *Spilanthes oleracea* (= *Acmella oleracea*), Asteraceae. Flowerheads are an antimalarial component of “Malarial.” Photo © Merlin Willcox. Color images available online at www.liebertonline.com/acm

patients. This suggests that patient immunity was playing a role in clearing the parasites.

Research in Mali has been ongoing to produce a new MTA for malaria that is more effective than Malarial, which is the least frequently used MTA.⁹ *Argemone mexicana* decoction has been selected³⁹ and has already undergone clinical trials.^{40–43} It is anticipated that it will soon be approved as a recommended MTA for malaria.

Psorospermine (*Psorospermum guineense*)

Psorospermum guineense Hochr. (synonym = *Vismia guineensis* (L.) Choisy, Hypericaceae) is a West African shrub (Fig. 8). A decoction of its bark, roots, or branches with leaves is widely used for skin conditions such as eczema, psoriasis,[§] scabies, cold sores, and leprosy.²³ It contains tannins, anthraquinones, and xanthenes. A dichloromethane extract of root bark is active against the intracellular forms of *Leishmania major*.⁴⁴

A double-blind, randomized, controlled clinical trial was conducted in Mali comparing “Psorospermine” (60 patients) with shea butter (50 patients) for the treatment of eczema in patients age 3 years and above.^{||} It was applied twice daily after washing with soapy water. After 15 days, the treatment failure rate was 18% in the Psorospermine group, compared



FIG. 8. *Psorospermum guineense* root extract is used to make an ointment for eczema. Photo, printed with permission, by © Dr. Sergio Giani. Color images available online at www.liebertonline.com/acm

to 86% in the shea butter group ($p < 0.0001$). It was more effective for acute than for chronic eczema (12% and 33% of treatment failures, respectively). It was more effective than shea butter for the different symptoms of eczema: pruritus, erythema, vesicles, exudation, and lichenification. Eighty-two percent (82%) of the patients treated with Psorospermine rated it as good or excellent, compared to 14% of patients treated with shea butter.^{||} Shea butter, widely used in cosmetics as a moisturizer, salve, or lotion, comes from the nut of the African shea tree (*Vitellaria paradoxa*), and the English name is derived from the name of the tree in the Malian language Bambara (*sisun*).

Discussion

The first advantage of “improved phytomedicines” is that they can be developed much faster and more inexpensively than new modern drugs.⁴³ This is because their use, preparation, and safety is already understood in traditional knowledge systems, and so preclinical development can be greatly accelerated. World Health Organization (WHO) guidelines⁴⁵ state: “If the product has been traditionally used without demonstrated harm, no specific restrictive regulatory action should be undertaken unless new evidence demands a revised risk–benefit assessment.” WHO maintains the position that there is no requirement for preclinical toxicity testing, but rather that evidence of traditional use or recent clinical experience is sufficient.⁴⁶ This is reflected in the Malian regulations, which only require toxicology and clinical trials for extracts, not for crude traditional preparations (Table 2).

The second advantage is that the end product is more widely available and affordable to patients in resource-poor settings than many pharmaceuticals are. MTAs are now considered part of the essential drugs list in Mali.⁵ In terms

[§]Diarra II. Contribution to the study of skin diseases and their traditional treatments in Mali [in French; PharmD thesis] Bamako, Mali: Ecole Nationale de Médecine et de Pharmacie au Mali, University of Bamako, 1990.

^{||}Traoré B. Contribution to research on a traditional treatment for eczema: Preliminary study on the feasibility of a clinical protocol [in French; MD thesis]. Bamako, Mali: Faculté de Médecine, Pharmacie et Odonto-Stomatologie, Université de Bamako, 1995.

of sales, the most successful have been Balembo, Gastrosédal, and Hépatissane, because there is no affordable conventional equivalent for the treatment of jaundice or hepatitis. The least successful has been Malarial, probably in part because it was more expensive than chloroquine, which until recently was the recommended first-line treatment for malaria, and because it was not perceived as effective by most prescribers.⁹ This emphasizes the need for a new MTA for malaria, which is currently being developed.^{40–43}

The third advantage, which is the most important for prescribers and patients, is that they perceive most MTAs to be effective. This was the main reason for choosing to prescribe them as mentioned by 85% of health workers surveyed in Kadiolo district.⁸ Interestingly, only 38% of prescribers and 29% of patients quoted the lower price as their primary reason for choosing to use MTAs. The most popular MTAs with prescribers were Gastrosédal and Laxa-cassia, and the most popular with patients were Laxa-cassia and Hépatissane.⁸ Medical students are taught about MTAs during their training, and the Department of Traditional Medicine has conducted training for doctors on the prescription of MTAs. In general it seems that practicing doctors only prescribe MTAs if they have received an additional training session. As in other parts of the world, it seems that some patients and doctors integrate traditional and modern medicines according to their perceived effectiveness.

One disadvantage of the production of standardized phytomedicines (as opposed to teaching people to grow and produce their own herbal medicines) is that their distribution is hindered by infrastructure problems, which also affect the distribution of conventional medicines. In the survey in Kadiolo district, MTAs were out of stock on an average of 78 days per year (21% of the time).⁸ However, the two approaches are not mutually exclusive, and the existence of a government-approved MTA legitimizes the approach of certain nongovernmental organizations to teach people how to grow and produce herbal medicines themselves.¹⁰

Research on MTAs has been constrained by limited financial resources and the need to strengthen research capacity. In particular, many of the clinical trials have been small, uncontrolled, and have remained unpublished. The Multidisciplinary University Traditional Health Initiative (MUTHI), a recently accepted European Union-funded project, is now attempting to contribute to redress this problem by providing training in both nonclinical and clinical aspects of developing improved phytomedicines. It is hoped that better clinical trials will be conducted and more MTAs will be developed as a result, both in Mali and in other African countries.

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Disclosure Statement

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